Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Vol. 7 No. 3 March 1954

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DOUGLAS McKAY, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

4.22 IMPROVED APPARATUS AND METHODS FOR QUANTITATIVE HYDROGENATION

Pack, F. C. and Planck, R. W. (Southern Regional Research Laboratory, New Orleans)
Journal of the American Oil Chemists' Society 30, No. 11, 461-463 (November, 1953)

The quantitative hydrogenation of unsaturated oils such as tung oil is carried out in a specially designed glass apparatus consisting of a 125-ml. Erlenmeyer reaction flask attached by means of a ground glass joint to a combination mercury-filled manometer and gas burette. The open end of the manometer is fitted with stopcocks so that the apparatus can be either evacuated, opened to the atmosphere, or filled with hydrogen. The mercury level in the manometer is controlled by a leveling bulb.

The solvent recommended for the determination is n-butyl propionate. The catalyst used is 10% palladium-on-carbon. The solution is agitated during the reaction with a magnetic stirrer.

In operation the apparatus is evacuated and is flushed repeatedly with hydrogen to remove all air. The oil sample, weighed in a micro beaker, is introduced into the reaction chamber but is not added to the solvent-catalyst mixture until a blank reading is made to measure hydrogen uptake by the solvent and catalyst. The oil sample is then added and the system is maintained under slight positive hydrogen pressure throughout the reaction. The reaction is allowed to proceed until the gas volume is constant. Less than one hour is required to hydrogenate 0.2-0.3 g. samples of tung oil.

The quantity of hydrogen taken up by the oil is calculated from the initial and final pressure-volume-temperature readings with appropriate correction for the blank value.

 ABSTRACTER: W. N. Sumerwell

4.5 LINOLEATE OXIDATION CATALYSTS OCCURRING IN ANIMAL TISSUES

Tappel, A. L. (University of California, Davis, California)
Food Research 18, No. 2, 104-108 (March/April, 1953)

A method is described for determination of lipoxidase in the presence of heme compounds based on the rate of oxidation of a colloidal suspension of sodium linoleate in a phosphate buffer, pH 7.0. The determination was carried out in a Warburg apparatus by measuring the oxygen absorption of the linoleate suspension in the presence of tissue extracts from various animal and fish muscles. Included in the tests were muscles of catfish, halibut, mackerel, salmon, shark, smelt, and tuna (species of these fish not stated). It was found that none of the extracts tested exhibited any lipoxidase activity. It was concluded that the catalyst responsible for the oxidation of the linoleate probably was in each case a heme compound. It is believed that other unidentified catalysts probably also play a part.

 ABSTRACTER: M. E. Stansby

4.13 THE LIPIDS OF FISH. 4. THE LIPIDS EXTRACTED BY AN ETHANOL:ETHER MIXTURE FROM HADDOCK FLESH PREVIOUSLY EXTRACTED WITH ACETONE

Lovern, J. A. and Olley, June
Biochemical Journal 55, No. 4, 686 (November, 1953)

1. Haddock flesh previously extracted with acetone was extracted with ethanol:ether (3:1, v/v). The crude product, although entirely soluble in light petroleum, contained over 50% of non-lipid impurities. A large part of this impurity was readily removed by the method of Folch et al. (1951) with only small accompanying loss of lipids. This loss, was however, selective. Some additional non-lipid was removed with an ion-exchange resin.

2. The purified extract was examined by countercurrent distribution between light petroleum and 85% ethanol. The component lipid classes found were lecithin, phosphatidylethanolamine, plasmalogens, waxes, hydrocarbons, inositol lipids and unidentified material. This last included possibly three different types of lipid.

3. The plasmalogen could not be satisfactorily characterized and much of it probably did not correspond to the established formula. The inositol lipids included two and possibly three components. Certain unidentified lipids were accompanied by a nitrogenous base previously reported (Olley & Lovern, 1953) and another fraction by a different nitrogenous compound or compounds.

4. The lecithin contained a fatty acid mixture generally similar to that of other lecithins previously isolated from haddock flesh. The unidentified lipids contained fatty acids showing certain variations from the lecithin pattern, but all similar in containing 20-30% of saturated components and having C_{20} acids, arachidonic acid or an isomer, as the most plentiful constituent.

 Author's summary

4.5 OXIDATIVE FAT RANCIDITY IN FOOD PRODUCTS. I. LINOLEATE OXIDATION CATALYZED BY HEMIN, HEMOGLOBIN, AND CYTOCHROME C^a

Tappel, A. L. (University of California, Davis, California)
Food Research 18, No. 6, 560-573 (November/December, 1953)

An investigation was made to determine whether fat oxidation in foods is catalyzed by hemin, hemoglobin, and cytochrome C^a at a temperature of 0° C. Oxidation of colloidal linoleic acid was followed by determination of oxygen absorption in a refrigerated Warburg respirometer.

All three substances -- hemin, hemoglobin, and cytochrome C^a -- strongly catalyzed linoleic acid oxidation at 0° C. Addition of propyl gallate, α tocopherol, or N.D.G.A. at the start of the reaction completely stopped the oxidation. Addition of these compounds after the reaction was under way only retarded the oxidation. Addition of ascorbic acid at the start of the reaction merely slowed down the oxidation rate somewhat. Addition of ascorbic acid after the reaction was under way actually increased the oxidation rate.

Some tests with pork tissue indicated that oxidation of pork fat in the tissue is a hematin-catalyzed reaction rather than an autocatalytic one.

 ABSTRACTER: M. E. Stansby

QUANTITATIVE HYDROGENATION

LIPIDS OF HADDOCK

MECHANISM OF FAT OXIDATION IN FISH

CATALYSIS OF FAT OXIDATION

4.5 (Cross Reference: 4.64)

3.23 FRYING BREADED FISH NON-STOP

Ziemba, John V.
Food Engineering 25, No. 12, 84, 85, 138, 139 (December, 1953)

A Gloucester, Massachusetts firm is processing breaded, deep-fat fried, frozen, bite-size fillets by a continuous process at the rate of 1,000 pounds an hour. The production of this item was preceded by extensive shelf-life and consumer-acceptance tests. Quality-control is based on a rigid 7-point system that involves:

"1. Inspecting fish on piers as they are unloaded from trawlers, upon arrival at the plant, and during filleting operations.
2. Removing lateral bones (to make a boneless product) and skin -- except for ocean perch.
3. Keeping fillets and seafood in a 32-38°F. cooler, but only when necessary prior to breading and frying.
4. Employing a thermostatically-controlled, continuous fryer.
5. Filtering frying oil continuously to remove burnt crumbs and small pieces of charred fish.
6. Checking all incoming ingredients -- eggs, bread crumbs, and shortening to determine if they conform to standards.
7. Packing the cooled, fried fish in greaseproof cartons."

Production of the ready-to-heat-and-serve fish proceeds as follows:

The fish are filleted by hand and transported to a 2- x 4-foot conveyor made up of 26 half-inch wide rubber belts spaced far enough apart to permit the operation of a series of rotary knives which cut the fillets into bite-size pieces.

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 ABSTRACTER: Kathryn L. Osterhaug

3.33 STOPS STRUVITE WITH NEW TECHNIQUE

McFee, Earl P. and Swaine, Robert L. (Gorton-Pew Fisheries Co. Ltd., Gloucester, and Arthur D. Little, Inc., Cambridge, Massachusetts, respectively)
Food Engineering 25, No. 12, 67, 190, 192 (December, 1953)

Water-insoluble crystals of magnesium ammonium phosphate hexahydrate (Struvite) resembling glass fragments or small grains of sand have been found in canned shrimp, crabmeat, salmon, tuna, flaked cod, flaked haddock, lobster, and roe. These crystals frequently are mistaken for ground glass by consumers of canned fish. More than one packer has been threatened with legal action because of these tasteless, odorless, and harmless crystals which readily dissolve in the acids of the stomach.

Crystals of magnesium ammonium phosphate hexahydrate form only after the seafood has been heat-processed, and possibly within a few weeks after canning. However, it may be 1 to 6 months before they actually appear in perceptible amounts, if at all, during the shelf life of the canned fish or shellfish.

Attempts made to accelerate the growth of crystals of magnesium ammonium phosphate hexahydrate in sealed cans by storing solutions of the salt at high temperatures or at low and then high temperatures in cycles were not entirely successful. These crystals were finally successfully grown by dialyzing magnesium chloride through a collodion membrane and into a solution of di-ammonium acid phosphate. This technique made possible the study of crystal formation.

Experimental treatments for reducing or preventing the growth of struvite crystals were evaluated by comparing the calculated growth potential of struvite with the actual quantity found by

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 ABSTRACTER: Martin Heerdt

3.5 INVESTIGATION ON KEEPING QUALITY OF MILD CURED HERRING TREATED WITH VINEGAR

Gilberg, Yngvar
Report on Technological Research Concerning Norwegian Fish Industry II, No. 11, 23 pp. (1953)
(English summary)

Mild cured herring products require special temperatures during curing to obtain the correct taste and texture. A means of controlling the curing process and knowing when the desired degree of cure has been reached would be of considerable value to cured herring producers. The development of trimethylamine nitrogen (TMA-N) and ammonia nitrogen (NH_3-N or total volatile nitrogen minus TMA-N) was found to be an indication of the organoleptic quality of cured herring (volume II, number 10 of the Reports on Technological Research).

The values for the TMA-N that results from the action of trimethylamine oxide (TMO)-splitting enzymes produced by certain bacteria are believed to give an index of bacterial activity. The difference between the total volatile nitrogen and TMA-N is believed to give an index of the over-all enzymic activity. Approximately 95 percent of this difference is ammonia.

Graphical data (omitted) showing the development of NH_3-N and TMA-N in herring to which had been added 8 percent salt, 6 percent sugar, and 0.8 percent acetic acid before covering with 10 percent salt brine and storing at 37° C. was used to evaluate the effectiveness of various preservatives. The herring were held at +10° C. for two days to allow for penetration of the preservative into the flesh before being stored at 37° C. Samples were withdrawn and analyzed for NH_3-N and TMA-N at regular intervals.

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 ABSTRACTER: Martin Heerdt

3.5 INVESTIGATION ON KEEPING QUALITY OF MILD CURED HERRING

Gilberg, Yngvar
Report on Technological Research Concerning Norwegian Fish Industry II, No. 12, 23 pp. (1953)
(English summary)

This is part II of a study concerned with the efficiency of various preservatives used for prolonging the storage life of light-salted (15 percent) herring cured without vinegar. Preservative efficiency was evaluated according to the method described in part I (the adjacent card). The rate of production of TMA-N was used as an indication of bacterial activity, and the rate of production of NH_3-N was used as an indication of proteolytic enzyme activity.

When used in a concentration amounting to 0.27 percent of the weight of herring and brine, magnesium benzoate was more effective than sodium benzoate, especially as a bacteriostat. Magnesium benzoate, 0.13 percent, combined with 0.035 percent $CaCl_2$ gave the same effect as 0.27 percent magnesium benzoate alone. Hexamethylenetetramine, 0.1 percent, was not as effective as Nipasol in retarding the production of TMA-N, but more effective than Nipasol in retarding the production of NH_3-N. Hexamethylenetetramine, 0.1 percent, when combined with 0.073 percent $CaCl_2$ was equal in effect to 0.27 percent magnesium benzoate. In pure 15-percent NaCl brine hexamethylenetetramine decomposed to give 20 mg. of NH_3-N per 100 ml. as against 26 mg. NH_3-N per 100 ml. in a more acid solution (part I). Accordingly, the preservative effect is greater at a more neutral pH due to the formation of formaldehyde.

When used in a concentration amounting to 0.22 percent of the weight of herring and brine, a very good effect was obtained from a solution composed of Nipasol 21 percent, magnesium benzoate 54 percent, and $CaCl_2$ 25 percent or a solution made up of hexamethylenetetramine 21 percent,

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 ABSTRACTER: Martin Heerdt

3.5 (Cross References: 7.81, 1.2)

The results obtained with the various preservatives were as follows:

(A) Sodium benzoate, 0.2 percent, showed a good proteolytic-inhibiting action but a poor bacteriostatic action. (B) Sodium benzoate, 0.2 percent, plus octylgallate, 0.015 percent, produced both a stronger enzymatic- and bacterial-inhibiting effect than benzoate alone. (C) Nipacombin, 0.1 percent, produced a bacteriostatic effect equal to B; its enzyme-inhibiting effect was noticeably inferior to both A and B. (D) Hexamethylenetetramine decomposes in an acid medium. In 0.7 percent acetic acid, 0.1 percent hexamethylenetetramine yielded 26 mg. of NH_3-N per 100 ml. Allowing for the added yield of ammonia, the enzyme-inhibiting effect of D was very good. The bacteriostatic effect of D was about equal to the bacteriostatic effect of B and C. (E) Sodium nitrite, 0.25 percent, prolonged the storage life of herring previously spiced with 1.4 percent of a commercial spice mixture.

Herring that received preservatives C and E had no rancid odor and the lowest Kreis red values. Herring that received preservative B had no rancid odor and a much lower Kreis value than A. Herring that received preservatives A and D had a pronounced rancid odor and Kreis values that were two and three times the values of the other lots of herring.

3.5 (Cross References: 7.81, 1.2)

magnesium benzoate 54 percent, and $CaCl_2$ 25 percent.

$MgCl_2$ was a stronger pro-oxidant of the herring oil than $CaCl_2$. The Kreis values resulting from combinations of hexamethylenetetramine and $CaCl_2$ were considerably higher than the values resulting from combinations of Nipasol and $CaCl_2$. The Kreis values in herring oil resulting from the use of the various preservatives were as follows: Nipasol 6, magnesium benzoate 14, hexamethylenetetramine 8, sodium benzoate 10, various combinations with $CaCl_2$ and $MgCl_2$ 20 or more. Nipasol and hexamethylenetetramine in combination resulted in a Kreis value of 3 in the salted herring oil as compared with a value of 2-3 for the fresh herring oil.

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The pieces are placed into 30-pound-capacity stainless-steel trays and transported in portable racks to the frying room. If there is a time lag at this point they are kept in a 32-38° cool room.

In the frying room, panloads of fish are dumped into a small, waist-level, stainless-steel hopper. A rubberized-canvas belt (1 x 15 feet), with 1/4- x 1 1/2-inch flights made from the same material and spaced 6 inches apart, elevates the fish onto a second conveyor.

The second conveyor, a 2- x 8-foot wire-mesh belt, takes the fish through a 30-gallon stainless tank, filled to a depth of 18 inches with a special egg batter. The fish are transferred from here on a 2- x 8-foot inclined wire-mesh belt which is equipped with a vibrator to remove the excess batter.

The fish now drop onto a 2- x 2- foot stainless belt traveling beneath a breading hopper. A vertical baffle plate in the breading hopper delivers a double stream of crumbs onto the canvas belt and over the fish. The depth of the bread crumbs on this short belt is 3 inches and, in this way, both the top and bottom of the fish are breaded at the same time.

The breaded fish are transferred onto another inclined wire-mesh belt (2 x 8 feet) which is also equipped with a vibrator to remove excess crumbs. The total amount of crumbs carried through the breading system is 400 pounds.

The breaded fish are carried on a horizontal wire-mesh belt through a 10-inch depth of hot, hydrogenated shortening within a transparent glass-enclosed continuous fryer (1 x 2 x 13 feet). The speed of the belt can be controlled to fry the fish 1 to 4 minutes, depending upon the thickness of the pieces. Average frying time is 2 1/2 minutes at temperatures ranging from 350° to 375° F.

The fish now travel through a glass-enclosed, multitier cooler on wire-mesh belts. Cooling to 90° F. takes 16 minutes. About 6,000 cubic feet of filtered air is forced through the cooler by a centrifugal blower. The cooled fish are packed into 1-pound cartons, machine-wrapped in printed waxed paper, and sent to the freezer.

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gravity separation. Magnesium was found by chemical analysis to occur in lower quantities than either of the other two struvite-forming chemical radicals in canned fish products. Magnesium, therefore, was a limiting factor in crystal growth potential. Analyses and calculations conducted with one canned fish product revealed a struvite potential of 0.28 to 0.43 percent on a wet basis.

The two existing methods of preventing struvite crystals in canned fish are (1) leaching the fish to remove magnesium and (2) keeping struvite in solution by various means. Both methods are patented but have never been put to use commercially. The crystals can be kept from forming by drastically reducing the pH of the fish with acids, but this usually alters the physical characteristic and flavor undesirably. Crystals also can be kept in solution by adding edible sequestering agents, but their selection is made difficult by the extremely low solubility of struvite.

A number of different substances were finally selected and tested by incorporating them before canning in samples of canned fish. Controls containing fish and no additive were carried along with the test samples. Most of the additives adversely affected the color, flavor, and texture of the canned product. Sodium hexametaphosphate (a sequestering agent), however, proved acceptable because: (1) it is an almost neutral salt with little or no taste, (2) it has been safely used in foods before, (3) it can be added either dry or in liquid form before canning or during filling of the cans, and (4) it is low in cost and only a small amount is required. Solubility experiments proved that sodium hexametaphosphate with common salt was responsible for holding in solution about 3 times as much struvite as either salted water or fish broth.

Canned fish and shellfish (lobster, shrimp, and crab) treated with safe quantities of sodium hexametaphosphate were completely without struvite crystals after 3 and 4 years of storage. Canned flaked pollock, haddock, cod and even cod for babies have been successfully canned with sodium hexametaphosphate for commercial sale.

6.132 WHOLE MEAL PROCESSING VIA VACUUM EVAPORATION

Anonymous
Meld. SSF, No. 5, 90-97 (1952)
Food Science Abstracts 25, No. 6, 643 (November, 1953)

Experiments on a commercial scale are reported. About 1,000 tons of herring were processed in 5 days of double shift operation. On the 1st and 4th days, the stickwater was run to waste; on the other days, it was concentrated in a double effect vacuum evaporator. In the subsequent admixture with presscake, the best results were obtained with concentrates containing 40 to 42% of total solids. The concentrated solubles were added to the presscake and thoroughly mixed with it before drying in the flame dryer; the presscake should be disintegrated. Yields were carefully calculated. The amounts of raw material needed per 100 kg. of meal, recalculated to a standard of 10% moisture and fat, were found to be: for ordinary meal, 570 and 541 l., and for whole meal, 436, 458, 468 l. By using stickwater, an increase in yield of about 24%, compared with ordinary production, was obtained.

Reprinted in whole

6.69 PLASTIC FROM FISH PROTEIN

Anonymous
Industrial and Engineering Chemistry 45, No. 12, 13A-15A (December, 1953)

The Study and Development Association for Norwegian Industry recently reported the initial industrial production of a new plastic molding powder made from fish protein. Skins and fresh fillet waste, amounting to about 30,000 tons annually, are available in northern Norway where production of the molding powder has been started. Five tons of fillet waste are required to make one ton of molding powder. The main types of protein found in fish waste are as follows:

In the muscle		In the skin	
myogen) globulin X)	globular (about 30%)	collagen) keratin)	fibrous
myosin) stroma)	actinomycin--fibrous (about 60%)		

In the manufacture of protein plastics, particularly those made from casein, the hydrophilic portions of the casein molecule usually absorb large quantities of water. The Norwegians have been able to block most of these hydrophylic groups by the addition of a synthetic resin material. Only 5 percent by weight of the resin material is required to reduce the water absorption of casein plastics by 80 percent. The resin material also improves the flow of the plastic in molding equipment, and the hardness of the final product.

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ABSTRACTER: Martin Heerdt

6.199 CELLULOSE DIGESTION BY RUMEN MICRO-ORGANISMS AND ITS STIMULATION BY FISHERY BY-PRODUCTS

MacLeod, R. A. and Brumwell, C. (Pacific Fisheries Experimental Station, Vancouver, B. C.) Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 96, 16-20 (October, 1953)

The possible advantages of including fishery products in cattle feeds have been receiving consideration. If the effects of the supplements are as beneficial as claimed, then one of their most likely methods of action would be the improvement of the activities of the rumen microorganisms. This is a report on the effect of fishery byproducts on cellulose digestion by rumen microorganisms "in vitro."

Rumen liquid was obtained from paunches of freshly killed steers which had not been fed for a period of 12 hours before slaughter. Immediately preceding this 12 hours they had been fed alfalfa or timothy hay. At each collection, samples from at least four steers were pooled. The liquid was strained through cheesecloth, diluted and used as the inoculum in the test tube fermentations.

In a typical rumen fermentation each tube contained inorganic salts that approximated the composition of the saliva; a source of nitrogen maintained at 24 mg. per tube; and cellulose in the form of a carefully weighed roll of dialyzing parchment. Each tube contained 20 ml. of inoculum in a final volume of 40 ml. To maintain a pH of 6.8 to 7.0, 0.5 M sodium carbonate was added whenever necessary. The tubes were incubated at 104° F. for 70 to 120 hours. Then the parchment rolls were removed, washed, dried and weighed. The loss in weight is a direct measurement of the extent of cellulose breakdown.

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ABSTRACTER: Neva L. Karrick

6.14 BAGS FOR HERRING MEAL

Sparre, T. and Arnesen, E.
Meldinger fra S.S.F., No. 6, 125-131 (October, 1953) (English summary)

Three different types of bags were used experimentally for storing herring meal. Type A were bags made from plastic material and used without the protection of a paper liner. Meal stored in these bags absorbed practically no moisture at all. The bags were strong as long as no tears or rents were present, but because they had no definite shape the outer layers of paper broke when the bags were handled roughly.

Type B were bags made from jute and provided with layers of plastic or asphaltic treated paper. Meal stored in these bags gained 1.5 to 2.0 percent moisture during 6 months of storage. The jute-paper combination did not have adequate strength unless the paper was cemented tightly to the jute with an asphaltic material.

Type C were bags made by laminating several plies of paper together with impregnated layers. Meal stored in these bags absorbed more moisture than meal stored in type B bags. Type C bags, however, were strong. Type C valve-type bags were especially strong, but type C open-mouthed bags had a tendency to break around the mouth or at the bottom when dropped for a considerable distance.

ABSTRACTER: Martin Heerdt

6.199

Whale solubles, herring solubles, herring stickwater and halibut hydrolyzate more than doubled the amount of cellulose digested. Other experiments showed that there was a considerable variation in the stimulation due to the amount of the rumen liquid inoculum.

Other substances were tested to determine whether they had an effect similar to that of fishery materials. A mixture of nine water-soluble vitamins, the ash of whale solubles, cysteine and methionine had no stimulatory effect. However, a combination of 18 amino acids provided greater stimulation than the whale solubles. A combination of whale solubles and amino acids was about five percent more active than amino acids alone.

The stimulation of activity is represented by a decrease in the length of the period between the time of inoculation of the flasks and the beginning of cellulose degradation, and is best interpreted as being due to the ability of the supplements to stimulate growth of the microorganisms to the point where measurable cellulose degradation can take place. Apparently the primary reason fishery byproducts are able to increase the rate of fermentation of cellulose is their content of free amino acids. Since the breakdown of any protein material provides free amino acids, would a supplement of fishery materials be expected to influence cellulose degradation in the living animal? The rumen microorganisms must be constantly regenerated in the paunch of the living cow. The paunch is quickly filled with hay and a relatively small inoculum must multiply to the point where the population is of sufficient size to bring about cellulose digestion within a reasonable time. Under these conditions supplements such as fishery byproducts which stimulate growth of the microorganisms would be expected to improve the efficiency of digestion of cellulose-containing materials.

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By means of controlled partial hydrolytic decomposition the fish protein has been modified to give molecular chain lengths that have satisfactory flow characteristics for a molding powder. The addition of formaldehyde to the modified fish protein molding powder produces a thermosetting material that has properties comparable with established thermosetting molding materials and can be produced competitively in Norway. The resulting plastic can be machined and will take a natural gloss on polishing. Transparent articles can be made, and no filler is required. The plastic material flows well and has good pressure-transfer characteristics.

7. 80 PHYSIOLOGICAL BACKGROUND OF FLAVOUR ASSESSMENT

Adrian, E. D. (Master of Trinity College, Cambridge, England)
Chemistry and Industry, No. 48, 1274-1276 (November 28, 1953)

Although a considerable amount of knowledge concerning the physiology of the olfactory organ has been accumulated, very little of that information can be used in improving the flavor of food. The reason for this is simply that the physiology of the sense organs tells us very little about our sensations. Sensations are elaborate constructions of the central nervous system which takes all the information about the outside world which comes in from the sense organs and welds it into a coherent picture.

Appreciation of food and drink depends on the signals which come into the brain from a number of different sense organs, from the eyes as well as from the nose and mouth. What people think of their food also depends on their upbringing and on what they have learned to regard as nice or nasty. In other words, the central nervous system acts as an editorial office for the information supplied by the sensory organs. People can analyze their sensory experiences to some extent but it is still the analysis of details that have been elaborately edited by the central nervous system. The work of the physiologist comes in at a much earlier stage, at the stage where the environmental change is analyzed by the sense organs. He can describe the sort of information they send in, but at present he cannot say how they are dealt with in the editorial office.

In the mouth are the sense organs which report information about the texture and temperature of food: temperature organs and tactile organs near the surface, pressure organs around the teeth and the organs which indicate movement and tension in the tongue and jaw muscles. All of these give information expressed in the same form, by a series of brief impulses traveling up the sensory

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 ABSTRACTER: Kathryn L. Osterhaug

8. 64 VITAMINS IN NORWEGIAN FISHES. I. NIACIN, PANTOTHENIC ACID, VITAMIN B_{12}, AND VITAMIN A CONTENT OF THE WHOLE FISH AND THE ORGANS OF HERRING (CLUPEA HARENGUS) AND MACKEREL (SCOMBER SCOMBRUS)

Braekkan, Olaf R. and Probst, Ada
Report on Technological Research Concerning Norwegian Fish Industry II, No. 13, 10 pp. (1953)
(English summary)

TABLE I. The vitamin content of different organs and whole raw herring. (Clupea harengus).

Sample of:	*Number*	*Ave weight*	*% dry matter*	*% Fat*	*% Ash*	% Protein (N×6,25)	Niacin µg/g	Ribo-flavin	Panto-tensyre	Vit. B_{12} µg/g	Vit. A IE/g.
Hel sild ..... ♀	61	287	33,0	13,9	2,2	17,6	28	2,6	8,7	0,10	19
Whole herring .... ♂	38	300	31,7	12,9	—	20,7	33	—	10,0	0,11	7
Kjott. ..... ♀			31,5	15,5	1,4	16,4	37	3.2	9 3	0,15	Spor.
Meat ..... ♂			33,3	14,0	1,3	14,7	41	3,4	9,7	0,12	(0—1)
Lever ..... ♀	177	1,6	23,5	2,0	1,7	18,4	44	6,8	21,0	0,47	610
Liver ..... ♂	114	1,7	23,0	1,6	1,5	—	56	7,9	—	0,30	—
Melke (*Hard roe*). ..	102	45	29	5,1	3,8	22,7	18,8	(1,7)	14	0,07	—
Rogn (*Soft roe*).	120	46	34,3	4,0	1,4	20,2	14,3	2,6	14,3	0,11	1,5
Rest innvoller Mix .	75	—	36,5	4,3	1,5	13,8	23	4,6	14,6	0,18	350
Rest intestines .... ♀	124	8	31,7	—	1,3	15,6	25,5	2,3	12,0	0,15	106
.... ♂	76	6	34,7	3,7	1,4	14,0	28	2,0	13,5	0,15	275

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7. 599 THE MAILLARD REACTION IN FLESH FOODS

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Food Technology 8 No. 1, 15-19 (January, 1954)

(This article is abstracted in two parts. Part 1 follows; part 2 appears under the file number 0. 33 on page 9.)

A quantitative method for measuring the extent of brown discoloration occurring during the heating of fish is described. The method involves measurement of the percent reflectancy of a sample of the cooked flesh, packed tightly in a small dish and referred to a standard. The standard consisted of a blend of 2. 5% magnesium carbonate and 4% high-viscosity carboxymethylcellulose in water. Reflectancy was measured with light of a wave length of 500 millimicrons using a Beckman DU spectrophotometer with a reflectance attachment.

Ribose and glucose were determined together by a filter paper chromatographic procedure. Flesh samples were blended with 9 volumes of 95% or absolute ethanol. The mixture was filtered and 30 ml. evaporated to dryness in vacuo over sulfuric acid. The residue was mixed well with 1 ml. water, and 0. 01-ml. portions spotted at 3-cm. intervals on Whatman No. 1 filter paper. The papers were developed at room temperature for 16 hours with ethyl acetate:acetic acid:water solvent (see Jermyn and Isherwood, Biochem. J. 50, 140-4 (1951)). After drying, the papers were sprayed with aniline hydrogen phthalate solution (see Partridge, Nature 164, 443 (1949)) and heated 5 minutes at 105° C., whereupon areas containing glucose and ribose were developed. The papers, cut lengthwise into 3-cm. -wide strips, were examined for density of colored area by use of a "spotometer" (see Paladini and Leloir, Anal. Chem. 24, 1024-5 (1952)) in a Beckman DU spectrophotometer with a wave length of 400 millimicrons and a slit width of 2 mm. A standard curve using known amounts of

(over)

 ABSTRACTER: M. E. Stansby

7. 80 BASIC CONSIDERATIONS IN REGARD TO FLAVOUR ASSESSMENT

Harvey, H. G. (British Food Manufacturing Industries Research Association, Surrey)
Chemistry and Industry, No. 44, 1163-1166 (October 31, 1953)

There is considerable evidence that the senses of taste and odor have an important function in the animal kingdom in assisting the ordinary choice and acceptance of food and also that these senses have a major role in the selection of foods that meet special nutritional requirements. Other factors such as visual appearance or even visual motion may also assist in the selection of food. However, these signs, whereby food is recognized, are of no value to the animal if it is fully fed.

The general reaction to a particular flavor by well-fed humans is still quite primitive in that it is usually one of like or dislike, or if two foods are being compared for flavor the instinctive response is simply either that one is preferred to the other or that no difference is apparent. In general, it is unnatural and much more difficult for a taster to say why or how two flavors differ, and this, it is suggested, is a very important consideration to be borne in mind when conducting flavor assessment tests.

The normal appraisal of any foodstuff in regard to its "flavor" is affected not only by the sensations of true taste and odor which are evoked in the mind of the consumer but also by such other factors as visual appearance, physical condition and temperature of the food and its texture or "feel" in the mouth.

The manner in which any flavor assessment may best be made will be determined by several principal factors which may be listed as follows: (i) The information sought from the test, (ii) the limitations imposed by the character of flavor sensations and the critical judgment, and (iii) the

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7.599 (Cross Reference: 8.59)

ribose and glucose was prepared. Using averages of six replicates good recoveries (±10%) of glucose or ribose could be obtained if the amount of sugar present was within the range of 5 to 20 μg.

Using this method the following results were found on various fish samples:

Pork (market sample of loin chop)	<10	170
Pork (market sample of rib chop)	<10	1940
Pork (loin chop stored 2 days at 2° C.)	0	120
Pork (loin chop stored 9 days at 2° C.)	<10	0
Veal (shoulder chop, market sample)	90	450
Veal (rib chop, stored 2 days at 2° C.)	<10	370
Beef tenderloin (market sample)	91	680
Beef wing steak (steer, stored 2 days at 2° C.)	0	670
Beef wing steak (cow, stored 2 days at 2° C.)	<10	700
Beef front shank (stored 2 days at 2° C.)	<10	260
Beef brisket (stored 2 days at 2° C.)	<10	610
Beef T-bone steaks (stored 2 weeks at 2° C.)	200	770
Beef round steak (market sample)	125	550

* 0 = No detectable ribose on the chromatograms; <10 = trace of ribose which could not be determined accurately.

7.80

requirements of statistical procedures. If the information sought is simply whether or not one flavor is preferred to another, then a properly planned consumer preference test, conducted strictly with reference to the population concerned, is indicated. Often, however, agreement may be reached as to the standard of perfection or the standard of flavor which is to be aimed at or maintained and the assessment procedure becomes essentially one of comparison or grading against one or more standard flavors. This class of test is usually termed a grading test. Broadly speaking, almost all kinds of tasting tests may be considered as falling into either of these two categories -- consumer preference and grading tests -- but the manner in which particular assessments are made may, in either category, vary widely according to the extent of the information sought and the effect of other factors (ii) and (iii).

The ability or aptitude for flavor assessment may conceivably vary in at least one of the following ways: (a) Between persons -- some people may have consistently greater discrimination, (b) Between particular types of flavors, and (c) Between different occasions -- for the same flavors and persons. These possible factors may be of considerable importance in certain types of flavor assessment but it cannot be said that they have yet been investigated with the thoroughness desirable.

In many grading tests it is desirable to classify different samples of one type of product into appropriate categories or grades and it often becomes reasonably practicable to decide upon an ordered sequence of grades, such as: Excellent (E); Very good (V.G.); Good (G); Fair (F); Poor (P); Very poor (V.P.).

In the ideal case, permanent or renewable standards corresponding to each of these grades may be realized and will, in fact, define the grades. In other instances, fewer standards may be possible and, in extreme instances, no permanent standards at all, so that the tasters have to rely solely upon memory standards.

7.80

nerve fibers at frequencies which vary from 10 to 300-400 per second. The impulses are caused by a sudden surface change in the nerve fiber; they are incapable of gradation and the only variable in the message is the spacing of the impulses. The more intense the excitation, the closer the spacing.

Flavor of food is signalled by the taste buds on the tongue and at the back of the mouth and by the olfactory organ at the back of the nose. The taste endings are stimulated by substances in solution in water and give rise only to sensations of sweet, bitter, salt and acid. Even more important than these taste perceptions are the signals which come from the nose and are due to air-borne molecules which are breathed in through the nostrils or are carried up in the air from the back of the mouth. Although the olfactory organ is a large and elaborate affair, it must be remembered that the specialized chemical sense organs are not the only ones that contribute to the total effect. The whole interior surface of the nose is covered with sensory endings and many vapors can stimulate these as well as the special olfactory endings. The sensitive surface of the olfactory organ covers a single cleft on either side of the septum. It is about 2 cm. on either side and contains several million cells packed side by side over the epithelium -- each ending with a bunch of slender hairs which project through or into the surface layer of mucus and water. It is presumably the arrival of the molecules on these hairs that is the essential step in olfactory excitation. How these molecules excite is not yet clear but it can be said that the olfactory organ sends the same sort of messages into the brain as do all the other sense organs and that judgments of flavor must be based on some kind of central analysis of signals made up of nerve impulses in a large number of units.

8.64 (Cross References: 8.61, 1.2, 1.1)

Fresh tissues were minced or homogenized and stored at -15° C. Niacin, riboflavin, and pantothenic acid were determined microbiologically by "Methods of Vitamin Assay", (1951). Tissues were digested with papain + takadiastase to extract pantothenic acid. Vitamin B_{12} was extracted in the presence of KCN at pH 5, and measured by the method of Thompson, Dietrich, and Elvehjem (1950) using Lactobacillus leichmanii. Vitamin A was determined chromatographically. The findings are summarized in Tables 1 and 2, this card.

TABLE 2. The vitamin content of different organs and whole raw mackerel. (Scomber scombrus.)

Prove av: *Sample of:*	Antall *Number*	Gj.sn. vekt *Ave. weight*	% tørrstoff *% dry matter*	% fett *% fat*	% aske *% ash.*	Protein (N×6,25)	Niacin μg/g	Riboflavin μg/g	Pantotensyre μg/g	Vit. B_{12} μg/g	Vit. A IE/g.
Hel fisk .....(3/5)	—	—	26	6,8	2,3	18,6	63	6,4	10,1	0,14	131
Whole fish ....(7/5)	31	420	26	6,1	2,3	18,2	62	6,4	10,4	0,14	75
..... (21/5)	31	475	26,2	5,8	2,2	17,8	63	4,3	11,7	0,13	86
Gj.sn. (*Ave.*)			26,1	6,2	2,3	18,2	63	5,7	10,7	0,14	96
Kjøtt .....♂			26,2	5,0	1,5	20	94	3,6	9,7	0,10	Spor
Meat .....♀			25,8	5,2	1,2	19,2	93	3,5	10,9	0,13	
Gj.sn. (*Ave.*)			26,0	5,1	1,3	19,6	93,5	3,6	10,3	0,12	Ca. 1
Lever .....♀	33	11,2	29,6	5,5	2,2	19,8	65	11,9	33,3	0,37	4035
Liver .....♂	49	5,9	30,9	9,9	1,6	19,8	92	10,7	33,2	0,66	5310
Gj.sn. (*Ave.*)			30,2	7,7	1,9	19,8	79	11,3	33,3	0,52	4670
Melke (*Hard roe*) ...	48	55,3	29,4	1,6	2,1	16,7	21	(2.2)	11,8	0,07	—
Rogn (*Soft roe*)	33	44,2	34,2	7,2	1,7	24,0	22	9,2	46	0,30	5
Rest innvoller	33	33,7	22,4	6,0	1,7	13,8	31	4,5	11,3	0,29	450
Rest intestines ... ♂	49	32,4	22,0	4,8	1,6	14,4	26	4,6	11,8	0,31	380

0.5

STUDIES ON THE NUTRITION AND METABOLISM OF MARINE BACTERIA. I. ISOLATION AND IDENTIFICATION OF THE MICROORGANISMS AND A PRELIMINARY SURVEY OF THEIR NUTRITIONAL REQUIREMENTS

MacLeod, R. A.; Onofrey, E.; and Norris, M. E.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 96, 11-14 (October, 1953)

A long-range program has been instituted at the Pacific Fisheries Experimental Station to study the life processes of marine bacteria. The purpose of these investigations is to provide basic information to aid in understanding the mechanisms of bacterial spoilage of fish and to aid in the control of the multiplication of these organisms.

Marine bacteria have been arbitrarily defined as bacteria from the sea which on initial isolation require for growth a medium containing sea water as the diluent. Accordingly, bacteria from the sea which are capable of growing both on a sea-water and a fresh-water medium on initial isolation would not be classified as marine bacteria. Since coastal waters are often well diluted with fresh water, many bacteria from these waters are capable of growing in a fresh- water medium. As these bacteria are important members of the flora of fish caught in coastal waters, a group of organisms of marine origin capable of growing in a fresh-water medium are under investigation as well as a group which qualify under the more restricted classification of marine bacteria.

Organisms capable of growth in fresh water have been designated Group A; those which require a sea-water medium for growth, Group B. Group A organisms were originally isolated from fresh lingcod. The isolations were made by selecting organisms that formed colonies when extracts of the fish were plated on nutrient agar prepared from distilled water. Group B organisms were

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 ABSTRACTER: Kathryn L. Osterhaug

0.5

PRELIMINARY INVESTIGATION OF THE BACTERIAL FLORA OF THE MACKERELS OF THE WEST COAST

Venkataraman, R. and Sreenivasan, A. (Fisheries Technological Station, Kozhikode, India)
Indian Journal of Medical Research 40, No. 4, 529-533 (October, 1952)

The bacterial flora of mackerel, Rastrelliger kanagurta, caught in gill nets 5 miles off the coast of Kadapuram, near Calicut, was determined qualitatively. Nutrient agar made with sea water was used as a plating medium for dilutions of bacteria obtained from surface slime, the gills, the viscera, putrid fish, and whole gutted fish. Typical colonies were transferred from the agar plates to agar slants. The various bacteria were identified by means of the gram-stain, the spore test, fermentation of sugars, gelatine liquefaction, reaction with litmus or brom-cresol-purple milk, indole production, nitrate reduction, H_2S production, the Voges-Proskauer reaction, and starch hydrolysis.

Altogether, 81 strains of bacteria were isolated. These have been classified according to Bergey (1948) and are shown in table I; their biochemical properties are shown in table II (this card, over).

 ABSTRACTER: Martin Heerdt

0.7

FEEDING OF RATS WITH SODIUM NITRITE AND HERRING MEAL PRODUCED FROM HERRING PRESERVED WITH SODIUM NITRITE

Njaa, Leif Rein and Braekkan, Olaf R.
Report on Technological Research Concerning Norwegian Fish Industry II, No. 14, 14 pp. (1953) (English summary)

Sodium nitrite was fed to rats daily for 70 days (total dose 400 to 600 mg.) without producing toxic effects. Growth was normal and autopsy of the animals revealed no abnormalities of the different organs. Meals made from sodium-nitrite-treated herring were also fed to rats. This diet contained 50% herring meal. The sodium nitrite intake from the meal was 70 to 105 mg. over a period of 70 days. The results are in agreement with the findings of Tarr and Carter (1942).

 ABSTRACTER: Martin Heerdt

0.33

THE MAILLARD REACTION IN FLESH FOODS

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Food Technology 8, No. 1, 15-19 (January, 1954)

(This article is abstracted in two parts. Part 2 follows; part 1 appears under the file number 7.599 on page 7.)

Evidence is presented which indicates that only the free and not the combined ribose in fish muscle takes part in Maillard reactions. It is shown that there is a relation between added ribose and the degree of browning in fish muscle and also between the indigenous ribose content and browning of the muscle of different varieties of fish. About five times as much glucose as ribose is required to cause the same degree of browning in fish flesh. It is shown that the free ribose and glucose content of different varieties of fish, and of beef, pork and veal is very variable, and that free ribose is only formed post mortem in fish muscle. The amount of ribose formed at 0° C. by fish and meats from added ribonucleic acid, ribotides, ribosides, adenosinetriphosphate and ribose-5-phosphate is recorded. Fish muscle forms ribose from all these substrates, beef and veal only from ribosides and ribose-5-phosphate and pork only from the last named compound. The enzymic formation of ribose in fish muscle is discussed with special reference to the riboside hydrolases concerned. The glucose and ribose content of meats is usually such as to indicate that significant Maillard reactions would occur only on extended heating, but no quantitative method of determining browning in these darker flesh materials was available. Physical methods of removing ribose from fish muscle as well as the possibility of destroying it enzymatically are discussed.

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STUDY OF MARINE BACTERIA

BACTERIAL FLORA OF INDIAN MACKEREL

DIETARY EFFECT OF SODIUM NITRITE

MAILLARD REACTION IN FISH

0.5 (Cross References: 2.01, 1.1)

Table I

Showing the distribution of various genera in different parts of mackerels examined

Source and total number	Micro-cocci	Achromo-bacter	Flavo-bacterium	Bacilli (spore-forming)	Miscellaneous
Slime 18	1	6	...	10	1 Pseudomonas
Gills 21	3	...	...	18	.....
Guts 3	...	1	...	1	1 Bacterium (Kurthia)
Putrid fish 13	...	...	...	13	.....
Whole fish (gutted) 26	14	3	2	5	1 Aerobacter 1 B. latericeus

Table II

Showing certain physiological properties of the organisms from mackerels

Source and total number	Gelatine liquefiers, percent	H_2S producers, percent	Indole producers, percent	Nitrate reducers, percent	Chromo-genic, percent
Slime 18	55.6	11.0	....	22.2	11
Gills 21	62.0	33.3	10.0	38.1	13
Guts 3	66.7	....	....	33.3	...
Putrid fish 13	61.5	....	....	54.0	23
Whole fish 26	30.0	27.0	....	42.3	65

0.5

isolated from colonies produced when fish extract and sea water were plated on a special medium prepared with sea water having a salinity of the same concentration as that prevailing in the open sea -- 30 to 40 parts of total salts per 1,000 parts of water. Organisms that formed colonies on ferric phosphate nutrient agar prepared with this sea water were tested for their ability to grow on the same medium prepared with fresh water. Only those organisms that would grow only if sea water were present were selected for inclusion in Group B. Microorganisms originating from sea water, the slime of brill (Eopsetta jordani), brill gut, and clams are included in the group classified as strictly marine bacteria.

It was felt that the information obtained would be of wider interest if the organisms were classified into the genera to which they belong. For this purpose standard bacteriological procedures were applied. The genera represented in the samples included Mycoplana (2 Group A, 8 Group B), Corynebacterium (3 Group A, 6 Group B), Flavobacterium (2 Group A, 5 Group B), Achromobacter (1 Group A, 2 Group B), Pseudomonas (2 Group B) and Vibrio (1 Group B). The two largest groups of organisms isolated belong to the genera Mycoplana and Corynebacterium.

Studies on the nutritional requirements of the marine bacteria were begun with the A group. To establish how fastidious the organisms are, three media were devised of increasing degrees of complexity.

With the information made available by the results of the above experiments, a new basal medium was devised containing glucose, ammonium sulfate, trace metals, a mixture of 18 amino acids, a mixture of 9 vitamins and adenine, guanine and uracil. All of the organisms but one grew on this medium. The further addition of enzymatic halibut muscle hydrolyzate and yeast extract, either alone or together, improved growth in only one or two cases. It was evident then, that all the organisms under investigation, with one possible exception, were capable of growing on media containing known nutritional essentials. It was then possible to systematically remove individual compounds or groups of compounds to gain information concerning the minimum requirements of the organisms.

0.7 (Cross Reference: 6.199)

2.3 ALUMINUM FILLETING TABLE

Wood, A. L. and Angevine, W. C. (Atlantic Fisheries Experimental Station, Halifax, N.S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 57, 9-11 (November, 1953)

Most of the larger fish filleting plants use metal for the construction of fish filleting, skinning, and packaging tables. Monel or stainless steels are usually chosen for table construction if the cost can be spread over a period of years, because these metals simplify fabrication problems.

Aluminum alloy metals also have proven suitable for use in table construction. They cost less than steel, but they are more expensive to fabricate. Smaller filleting plants have difficulty in meeting the cost of all-metal tables and usually continue to use wood, which is not entirely satisfactory for the purpose.

The Atlantic Station has designed the 6-man, all-metal filleting table pictured in Figure 1 (this card, over) and described below; its advantages over other designs are as follows: (1) The total cost of all materials is $150.00 for a 10-foot, 6-filleter table and $300.00 for a 20-foot, 10- or 12-filleter table; (2) Materials for the construction of these tables are stock aluminum pieces that may be transported in even an automobile if necessary; (3) Plans for these tables are available from the Atlantic Coast Station at a cost of one dollar; (4) The frame may be built by anyone of average mechanical skill in a few hours with the aid of a hack-saw, hand-drill, wrench, and screwdriver. A metal shears, four clamps, and 2 or 3 pieces of wooden "2 x 4" are the only tools needed to install the aluminum troughs. All troughs are made from standard aluminum sheets 4' x 12' in size and of 0.032" thick 57S 1/2H alloy; (5) Extension of a 10-foot table to make a 20-foot table requires only additional materials. There is no loss on the original table; (6) The same aluminum stock pieces

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 ABSTRACTER: Martin Heerdt

2.9 A NOTE REGARDING THE TOXICITY OF THE FISHES OF THE SKIPJACK FAMILY, KATSUWONIDAE

Halstead, Bruce W. (College of Medical Evangelists, Loma Linda, California)
California Fish and Game 40, No. 1, 61-64 (January, 1954)

There are many references in the literature regarding the toxic properties of various scombroid fishes. However, in most of these accounts bacterial food poisoning resulting from spoilage has been shown to be responsible rather than true fish poisoning, which is caused by a neurotoxin that is present in the tissues of the fish. Some of the reports are concerned with a type of histamine intoxication that sometimes appears to be caused by certain tropical scombroid fishes. These histamine outbreaks have, in most instances, resulted from eating tuna, bonito or skipjack, which are a day or more old, rather than from freshly caught fish. Inadequate refrigeration or failure to cook the fish promptly after capture appear to be significant contributing factors.

The symptomatology occurring in histamine intoxications caused by scombroid fishes is described. Legroux, Bovet, and Levaditi (1947) examined a large piece of "tuna" that had caused a severe histamine reaction in four persons. Bacteriological examination of the sample revealed no human pathogens. Intramuscular injections of tissue extracts of the "tuna" into guinea pigs resulted in nervousness, inactivity, muscular tremors, convulsions and death within five minutes. The toxic substance was not inactivated when the extract was boiled for 20 minutes in a water bath. When the guinea pigs were pretreated with antihistamines prior to injection of the tissue extract no toxic reactions were observed. The workers thus concluded that histamine was present in the "tuna" and probably resulted from the decarboxylation of histidine. It was suggested that the histamine could have been produced by bacterial enzyme action, aseptic cytolysis, or that it may have been a normal physiological condition of the fish during spawning season.

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 ABSTRACTER: Roy C. Stevens

2.115 THE TUNA CLIPPER OF THE PACIFIC

Hanson, H. C
World Fishing 2, No. 11, 430 (November, 1953)

The following is the author's summary of a paper presented at the FAO-sponsored World Fishing Boat Congress, Paris, France and Miami, Florida, October, 1953.

These single-purpose vessels, as designed, are probably the most costly and most complicated fishing vessels built on the Pacific coast.

Although the majority of tuna clippers are of wooden construction, the author recommends the steel vessel in the interest of the least up-keep costs and longevity. Therefore, after a brief description of one of the earliest wooden craft, the paper is devoted mainly to the welded steel clipper Sun Dial, one of the largest of the type ever built.

The three basic elements of design that must be adhered to for a tuna clipper of this type are that: (i) the vessel must be able to carry live bait for extended periods of time; (ii) the stern must be kept low so that fishermen may work at water-level with ease at all times; (iii) the vessel be seaworthy in all conditions at all times.

The Sun Dial meets all these requirements; she is a well rounded, full bodied vessel, with a good beam and carries some 400 tons. She is full aft and carries her load without squatting, and the wheel does not pull her stern down when running at full speed. There follows a detailed description of the vessel, her catching, bait carrying and refrigeration equipment, illustrated with profile and arrangement drawings and photographs.

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 Author's summary

2.00 INVESTIGATION OF THE SOURCE OF AN OFFENSIVE ODOR IN A SHIPMENT OF GRAY COD

Boyd, J.; Brumwell, C.; and MacLeod, R. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 96, 20-21 (October, 1953)

One lot of gray cod characterized by a particularly nauseating odor was landed at Vancouver, B. C. in August 1953. The fish were taken by otter trawl off the northeast corner of Goose Island. They were washed, well iced in the round, and only 50 hours out of water when landed. According to the vessel captain this was his second catch of the season having the nauseating odor.

Samples of these fish were examined at the station laboratory and compared with gray cod obtained from two other boats in port at the same time. The cod on the other two boats had been caught, respectively, in the Goose Island area and in the vicinity of Ucluelet; but they did not have a nauseating odor.

Examination of the gray cod with the nauseating odor revealed a normal firm flesh and a normal stomach contents except for more than the usual number of worms in the digestive tract as compared with the gray cod from the other two vessels. Bacterial counts of the flesh of the fish from all 3 boats revealed that those with the nauseating odor actually contained fewer bacteria per gram. The cod from all 3 boats would be classified as very fresh on the basis of these counts. Similar types of bacteria were present on the fish from all 3 boats.

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 ABSTRACTER: Martin Heerdt

ALUMINUM FILLETING TABLE

TUNA CLIPPER DESIGN

TOXICITY OF SKIPJACKS

OFFENSIVE ODOR IN GRAY COD

2.115

As a matter of added interest, the first steel tuna boat built and used in Hawaiian waters is briefly described and illustrated.

In the light of recent explorations by the U. S. Government's Fish and Wildlife Service, in which it is shown that tuna fish can be caught commercially at greater depths than was formerly thought possible, it would seem that the most desirable type of vessel for this purpose would be one that could be used as a tuna clipper and could long line for the fish as well.

In the author's opinion, the "100 ft. combination fishing vessel" (the subject of another paper by this author) would be the most desirable to build for future use. Present tuna craft need not be discarded, but would have to be altered to conform to both usages by having portable bait tanks as well as portable long line equipment.

2.00 (Cross References: 2.19, 1.5)

Swabs of the surface of the fish hold that contained the nauseating fish showed that the boat was free from bacterial contamination. No explanation can yet be given for this occurrence of nauseating odor in gray cod.

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also may be used in the construction of skinning, candling, and packaging tables; (7) Any of the foregoing tables may be dismantled and stored indefinitely in a space 2' x 2' x 10' long.

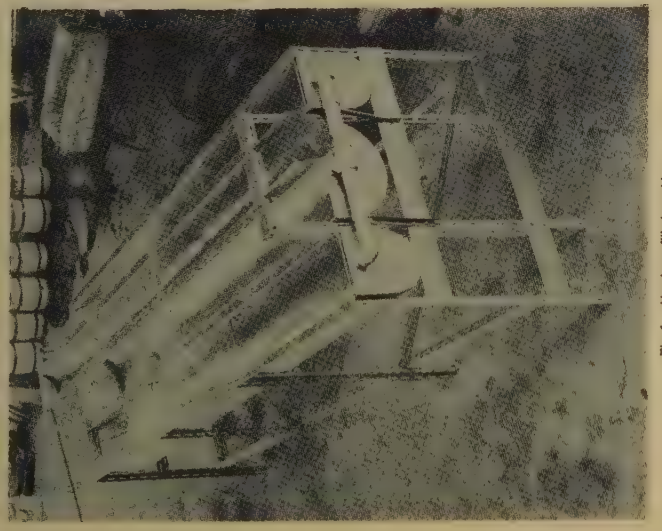

Fig. 1. Aluminum filleting table

2.9 (Cross Reference: 1.1)

A case of fish poisoning involving a family of four and their pet cat at Johnston Island in 1950 is reported by the author. The fish that was eaten was a black skipjack, believed to be Euthynnus yaito Kishinouye. It was cleaned and cooked within a short time after capture, so there was no opportunity for spoilage. Neighbors stated that they had eaten the same species of fish on previous occasions without ill effects. This outbreak is especially noteworthy in that the victims developed neurotoxic symptoms. In addition, the symptoms present were typical of the Ciguatera-type of ichthyosarcotoxism such as is commonly produced by most reef fishes, rather than the usual histamine reaction that has been observed by previous workers. This outbreak reemphasizes the need for further investigation on poisonous fishes.

3.249 THE FREEZING AND COLD STORAGE OF HERRINGS

Banks, A. (Torry Research Station, Aberdeen, Scotland)
Modern Refrigeration 54, No. 637, 96-98 (April, 1951)

Freezing and cold storage appears to be the only way in which seasonal supplies of fresh or lightly smoked herring can be made available throughout the year. Herring are very susceptible to changes in flavor because of the development of oxidative rancidity in the fat; consequently, they present special problems in preservation. Lovern (1938) has shown that herring fat not only contains a large proportion of labile fatty acids but, in addition, a fat oxidizing system that will produce rancid products even at temperatures as low as -22° F. (-30° C.). Studies made by the author in 1939 showed that haemoglobin, cytochrome-c, and other complex compounds present in fairly high concentrations in the lateral band of red muscle of herring are probably responsible for the observed catalytic effect.

Rancidity depends on chemical reaction between the unsaturated fat and gaseous oxygen; consequently, it is influenced by temperature, ease of access of air, antioxidants, and prooxidants. Storage at low temperatures alone is not sufficient to prevent undesirable changes in flavor. Furthermore, it is necessary to provide for at least 6 months of storage to have a year-around supply of herring.

Tarr (1948) has shown that frozen fish can be successfully stored in an inert gas; however, gas storage is impractical for frozen fatty fish because the allowable concentration of oxygen in the gas phase is too low for commercial operations. The author (1938) has shown that thin films of ice are almost impervious to oxygen at low temperatures, and therefore that glazing will protect frozen herring effectively from rancidity during storage. Glazing has been used effectively to keep Scottish

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 ABSTRACTER: Martin Heerdt

3.12 AUREOMYCIN IN EXPERIMENTAL FISH PRESERVATION

Boyd, John; Brumwell, C.; and Tarr, H. L. A. (Pac. Fish. Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 96, 25-28 (October, 1953)

Two series of fresh-fish-storage experiments were carried out. Experiment one, in series one, was conducted with 16 beheaded and dressed lingcod that were still in rigor mortis when obtained. The fish were iced immediately, ventral side up, 4 fish to each of four galvanized tanks equipped with drains, and stored in a large insulated box. They were packed in ordinary ice (tank a), in 2 p. p. m. aureomycin ice (tank b), in 2 p. p. m. aureomycin plus 200 p. p. m. potassium acid phosphate ice (tank c), and in 4 p. p. m. aureomycin ice (tank d). Potassium acid phosphate was used to render the aureomycin more stable. Chunks about 3 inches thick were removed from one of each lot of fish at intervals of 3, 7, and 9 days and stored for 24 hours at 50° F. in covered glass containers. The number of bacteria present at the end of the 50° -F. storage period was determined by direct count. Table 1 (omitted) shows that all 3 of the aureomycin ices effected a very marked improvement in keeping quality, but that there was no important difference between the bacterial counts obtained.

Experiment two, in series one, was conducted similarly to experiment one except that the chunks of lingcod were not stored at 50° F. after removal from the ice. Here again the different ices containing aureomycin effected a very marked and almost equal improvement in the keeping quality of the fish. After 15 days lingcod stored in ordinary ice contained 420 million bacteria per gram, whereas those stored in ice containing 1 p. p. m. of aureomycin contained only 65 million. Ices containing aureomycin therefore appear to extend the edible quality of lingcod about 5 days.

Experiment one, in series two, was concerned with troll-caught, small, red, spring salmon that were stored for 6 days aboard the troller. The fish were dressed and then washed. Part of them were

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 ABSTRACTER: Martin Heerdt

3.230 TUNA PIE UNVEILED BY THREE PACKERS

Anonymous
Quick Frozen Foods 16, No. 5, 87 (December, 1953)

Three frozen-food packers have recently made available a new item -- frozen tuna fish pie. All three companies are putting the product up in 8-ounce packages that retail from 35 to 39 cents.

Considerable time is said to have been spent in developing the product to the point at which its quality and flavor would compare favorably with the canned version. One of the greatest obstacles to be overcome was oxidation, which resulted in a considerable discoloration of the product.

One company reported that, although the item was market tested without any advertising support, sales were so great that production lines at one time were not able to keep up with the demand. One Denver chain was said to be ordering the tuna pie in lots of 3,000 cases.

 ABSTRACTER: Roy C. Stevens

2.114 ENGINES AND PROPELLERS

Symposium
World Fishing 2, No. 12, 503-511 (December, 1953)

Summaries of the following papers presented at the First International Fishing Boat Congress, Paris, France and Miami, Florida, October and November, 1953, respectively, are given:

Some Remarks on "Corporation" Type Trawlers Fitted with 4-Stroke Low Speed Diesel Engines
by Jean Faure (France)

Variable Pitch Propellers for Trawlers
by M. Rouchet (France)

Free Piston Generators and Gas Turbine Propulsion on Board a Deep Sea Trawler
by Augustin Norman Fils (France)

Considerations of Two- and Four-Stroke Diesel Propulsion for Trawlers
by Andre Dussardier (France)

Controllable Pitch Propellers
by P. S. Stoffel (France)

Controllable Pitch Propellers for Fishing Craft
by K. G. Rosenthal (Denmark)

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STORAGE OF FROZEN HERRING

FROZEN TUNA PIE

AUREOMYCIN AS FISH PRESERVATIVE

ENGINES AND PROPELLERS

2.114

Semi-Diesels Versus Diesels
by Ivor Stokke (Norway)

High-Speed Diesels for Use in Fishing Craft
by William C. Gould (U.S.A.)

Vibration in Small Ships
by James Whitaker (U.K.)

Fixed-Blade and Controllable-Pitch Propellers for Fishing Boats
by J. A. van Aken (Netherlands)

The Use of Medium-Speed Diesel Engines on Board Fishing Vessels
by D. E. Brownlow (U.K.)

Oil Engines for Trawlers
by C. J. Hepton (U.K.)

Some Aspects of the Motorisation of Fishing Craft in Chile
by Paul Ziener (Chile)

3.249 (Cross Reference: 1.2)

summer herring for as long as 6 to 8 months at -18°F. to -22° F. (-28°C. to -30°C.). The effectiveness of an ice glaze depends to a large degree on the amount of desiccation that occurs during storage. In fact, a qualitative relationship has been found to exist between the amount of drying and the development of rancidity in cold-stored herring.

The use of antioxidants for inhibiting fat oxidation in natural foods does not appear to be very promising, for the problem is one of protecting not pure, dry fat but fat containing phosphatides and other complexes which may be oriented in some way with an aqueous phase. Herring present a good example of the difficulties in that they may contain 20 percent fat which exists partly in an ill-defined adipose tissue and partly as globules in between the muscle fibers of the lateral band of red muscle. In addition, the whole of the fat is closely associated with muscle containing the cytochrome oxidase system, one of the most powerful oxidizing systems known.

In the United Kingdom, extensive tests with ascorbic acid, gallic acid, ethyl gallate, and catechol at the recommended concentrations with whole and filleted herring have shown these substances to have a slight inhibitory effect but not one of any real significance. The effect of superficial desiccation during cold storage was a significant feature of the experiment. Frozen fillets that were well wrapped in parchment paper dried very rapidly during storage and, apparently, as a result became rancid much more quickly than whole herring that had been frozen in 7-pound slabs with 10 percent added water.

Herring are being commercially air-blast-frozen in 7-pound lots in limited quantities in the United Kingdom in -22° F. (-30°C.) air moving at about 800 feet per minute. In some instances multi-plate freezers are also being used to freeze herring in packages. The air-blast-frozen herring are glazed after freezing and packed in fiberboard cartons for storage. The herring frozen in packages are not glazed but are simply packed in cartons for storage. Frozen herring stored at -4° F. (-20°C.) or below were quite popular on the retail markets. The glazed blocks of herring were observed to retain their glaze for 4 to 5 months at -13° F. (-25°C.).

3.12

stored in ordinary ice in the customary manner. The remainder were immersed in about 1/3 their weight of clean, refrigerated sea water maintained at 30° F. and containing 2 p.p.m. of aureomycin. After 6 days aboard the vessel under the foregoing conditions the two lots of fish were landed on shore and carefully iced with ordinary ice in the same insulated tanks that were used in series one. Bacterial counts were made after 6, 9, and 14 days of storage. The counts as reported in table 2 (omitted) show that the salmon held initially in aureomycin had 0, 0.1, and 12.1 million bacteria per gram, whereas the salmon held initially in ice had 25, 62, and 212 million bacteria per gram.

Experiment two, in series two, was concerned with a lot of troll-caught coho salmon that weighed about 7 pounds each initially. They were eviscerated promptly after capture, the gills were removed, and the visceral cavities were washed thoroughly with clean sea water. Two fish from the lot were dipped for 1 minute in plain sea water. A second pair of fish was dipped for 1 minute in sea water containing 5 p.p.m. of aureomycin. A third pair was dipped for 1 minute in sea water containing 10 p.p.m. of aureomycin. And, a fourth pair was dipped for 1 minute in sea water containing 5 p.p.m. of aureomycin plus 200 p.p.m. of potassium acid phosphate. Each of the dipped pairs was then promptly stored in ordinary ice and reiced on arrival on shore.

After 13 days in ice there were, respectively, 8, 0.8, 1.0, and 0.5 million bacteria per gram of salmon tissue. After 18 days in ice the bacterial counts on the second of each pair of fish did not show any appreciable difference. The aureomycin solutions used apparently were too dilute for any more than a moderate preservative effect.

Similar tests based on brief periods of immersion in solutions containing 50 or 100 p.p.m. of aureomycin were very effective for improving the keeping quality of salmon.

6.134 REGULATION OF THE RATE OF DRYING

Anonymous
Meld. SSF, No. 3, 60-66 (1952)
Food Science Abstracts 25, No. 6, 642 (November, 1953)

In direct heat rotary dryers (flame dryers), the meal is often passed too rapidly through the drum. One method of retarding the rate of the operation is described. The drum is divided into drying zones; every particle of meal falling into the various sections is returned to the preceding zone, where it remains until it is sufficiently dry to be blown to the next zone. The rate of drying differs for the larger and smaller particles in the meal, but, by means of this arrangement, automatically constituted zones prevent the retention of any sufficiently dried particles. The moisture content of different fractions of several meals was shown to vary with particle size.

COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in whole

6.137 PLANT PRODUCES FATTY ACIDS FROM FISH OILS AND OTHER FEED STOCKS

Anonymous
Chemical Processing 17, No. 1, 54-55 (January, 1954)

A plant for the production of fatty acids from fish and whale oils has been in operation since early 1953 in Sandefjord, Norway. Other oil stocks such as palm kernel oil, tallow, and cottonseed oil may also be fractionated for fatty acids in this plant.

The patented fractional distillation system shown in the flow diagram (this card, over), is the essential part of the new plant. The still is fed from one of three 132,000-gallon storage tanks at the rate of 30 tons per day. Four fractions are obtained as follows: (1) an odor and color fraction, (2) a low molecular weight fraction, (3) a high molecular weight fraction, and (4) a residue. The table (this card, over) shows typical results from fractionating mixed whale and herring oil acidulated foots.

Any of these fractions may be refractionated by passing it through the still a second time. This is the method used to obtain high-purity myristic acids, palmitic acids, etc. Alternately, blended fatty acid mixtures of known composition with specific properties may be made.

Since the raw materials available are of diversified origin, high-pressure batch splitting is used instead of continuous splitting. The raw stock is refined with dilute sulfuric acid and then washed with water before it is split. Fractions from the still are received in 26,420-gallon aluminum tanks that have external heating coils beneath their spherical bottoms. The fatty acids are pumped from these tanks to the flaker or to block-molding.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

6.137 LIQUID-LIQUID EXTRACTION

Pratt, Thomas W.
Journal of the Americal Oil Chemists' Society 30, No. 11, 497 (November, 1953)

The theory, engineering principles, and use of liquid-liquid extraction in industrial operations is described in considerable detail.

Liquid-liquid extraction is the application of partial solubility to the separation of liquid mixtures of two or more components. This type of extraction is applied to mixtures that cannot be resolved by distillation. The major problem involved in developing a successful liquid-liquid extraction process is to find a solvent with which the mixture is partially miscible and in which one component of the mixture is more soluble than the other components in the mixture.

An important type of solvent extraction is that known as countercurrent extraction. In this process the liquid mixture or feed enters the extracting unit and flows in one direction through a series of stages. The solvent enters and flows in a direction opposite to the feed mixture. Thus the most soluble components in the mixture will pass into the solvent layer while the less soluble substances will remain in the feed layer or enter the solvent layer slowly. The feed mixture and solvent layer leave the extracting unit at opposite ends.

The problems encountered in designing plant extraction units using such solvents as propane, phenol and furfural are discussed.

Other subjects explored in the article are methods of recovering solvents, selection of pumps and instruments, and the handling of feed mixtures with abnormal properties such as high viscosity.

COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: W. N. Sumerwell

6.53 PETS HAVE HEARTY APPETITES

Anonymous
Southern Fisherman 14, No. 1, 91 (January, 1954)

A survey conducted by a well-known can manufacturing company reveals that more than 1,500,000,000 cans of pet food were used in 1953 to feed the nation's 22.6 million dogs and 26.7 million cats. Production of canned pet foods has doubled in five years.

On a country-wide basis, 54 percent of the dog-owning families buy meat-based canned pet food, while 33 percent of the cat owners buy fish-based canned products. In the cities the figures jump to 74 and 53 percent, respectively.

A similar study conducted six years ago, in which only dogs were counted, showed a canine population of 17 million. This means that the number of these animals has increased by about 900,000 a year.

The survey showed that at the present time 78 percent of all dog owners purchase foods expressly for their pets, and 58 percent of all cat owners do the same.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Roy C. Stevens

American Can Company's survey produced the chart, above, on the eating habits of canine and feline pets.

6. 53

Typical Results of Fractionating Mixed Whale and Herring Oil Acidulated Foots

	Per Cent	Acid Value	Iodine Value
No. 1 Fraction	8	237	33
No. 2 Fraction	40	210	80
No. 3 Fraction	40	181	194
Residue	12	85.	162

Note: Feed stock has acid value of 181, iodine value of 138. Still is operating at feed rate of 4000 lb./hr.

Simplified flow diagram of fatty acid fractional distillation system at Sandefjord, Norway

6. 137

0.34 SEA FOAM

Southward, A. J. (Marine Biological Station, Port Erin, Isle of Man)
Nature 172, No. 4388, 1059-1060 (December 5, 1953)

Sea foam samples were collected on the shore at Kallow Point, Port St. Mary, Isle of Man, in December 1948 and April 1949. After allowing 24 hours for the sample to settle, 0.5 liter of the foam was reduced to 5 cc. of an opalescent yellow-brown fluid. This fluid had an odor typical of the seashore and similar to that of sponges and seaweed. It contained particulate matter of microscopic size. The few recognizable particles, some of which were planktonic in origin, consisted of parts of copepod cuticle, diatom frustules, and green flagellates. Particles of littoral or benthic origin such as sponge spicules, foraminiferan shells and algal fragments were also recognized. Most of the particles, however, could not be identified. These ranged in size from 0.5 to 10 μ in diameter, but the majority were about 1 μ in diameter, or of just colloidal dimensions. The latter showed a strong tendency to form a layer at air/water interfaces.

By drying 4 cc. of the residual fluid at 105°C., 0.17 grams of total solids was obtained. Since 0.135 grams of the total solids was salt only, the remaining 0.035 grams could possibly consist of particulate matter. This dry particulate matter was found to be negative for cellulose, protein, and pentose. Both proteins and pentoses are examples of substances that can produce stable foams by adsorption in the form of a rigid interfacial layer of monomolecular thickness; consequently, the quantity of stabilizing material may have been too small to be determined qualitatively by the tests used. The food content of the foam obviously could not be particularly significant if the tests for cellulose, protein, and pentose were negative.

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 ABSTRACTER: Martin Heerdt

0.5 STUDIES ON THE NUTRITION AND METABOLISM OF MARINE BACTERIA. II. SOME MINERAL REQUIREMENTS OF MARINE BACTERIA

MacLeod, R. A. and Onofrey, E. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 97, 18-20 (December, 1953)

Two groups of organisms are being studied: **(A)** those able to grow in a fresh-water medium and **(B)** those which on initial isolation grow only in a sea-water medium. Growth of Group A was supported by a relatively simple mixture of inorganic salts in a medium containing chemicals of a high degree of purity. The salts included: (1) potassium mono- and di-hydrogen phosphates and (2) Speakman's Salt Mixture, a mixture of magnesium sulfate, manganese sulfate, ferrous sulfate and sodium chloride. All six organisms tested required potassium, magnesium and phosphate ions. The sodium ion was required by two. Sometimes omission of other ions caused decreased growth or changes in pigmentation.

TABLE I.—Some mineral requirements of organisms of the A Group.

Organism	Ions shown to be required for growth	Comments
A-5	Magnesium, potassium, phosphate	
A-11	Magnesium, potassium, phosphate, sodium	No pigment if maganese ion omitted
A-19	Magnesium, potassium, phosphate, sodium	Iron (ferrous) ion stimulatory; manganese affects pigmentation
A-21	Magnesium, potassium, phosphate	Manganese ion stimulatory in the absence of fixed nitrogen source
A-28	Magnesium, potassium, phosphate	Sodium ion stimulatory
A-29	Magnesium, potassium, phosphate	

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 ABSTRACTER: Neva L. Karrick

0.39 RELATION OF CHEMICAL STRUCTURE TO IRRITANT RESPONSES IN MARINE FISH

Hiatt, Robert W.; Naughton, John J.; and Matthews, Donald C. (University of Hawaii)
Nature 172, No. 4385, 904-905 (November 14, 1953)

The authors tested more than 500 selected compounds in their search for irritant chemicals capable of repelling fish. The relationship of chemical structure to irritant response received particular attention. Chemicals found most active for repelling sharks during World War II were of little use as repellents for bony fish.

All tests were conducted with four or five fish (Kuhlia sandvicensis) in 50-liter aquaria. The fish were exposed for only 2 minutes to chemicals dissolved in sea water, because the prime objective of this study was to find rapid-acting irritants. The responses observed were rated as violent, medium, slight, and none. Nearly all irritants attacking the common chemical sense produced excitation, body shaking, and rather violent swimming. Respiratory poisons induced gulping, swimming at the surface and general depressed activity. Certain other substances evoked responses such as tetanic and flaccid paralysis, operculum and fin distension, disorientation, and convulsions.

Lachrymators and skin irritants were the most effective of the physiologically active chemicals. Certain insecticides of the irritant type (pyrethrins) were moderately effective, as were respiratory poisons, e. g. the cyanide ion, which inhibits respiratory enzymes. Lachrymators and skin irritants reportedly function through the inhibition of thiol groups in enzymatic systems.

Chemicals that inhibit thiol groups may be classified as (1) mercaptide-forming agents such as heavy metals and metalloids which displace the hydrogen of the thiol, (2) oxidizing agents which oxidize

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 ABSTRACTER: Martin Heerdt

0.33 SOME STUDIES ON THE DESTRUCTION OF AMINO ACIDS IN PROTEINS CAUSED BY AUTOCLAVING IN PRESENCE OF GLUCOSE

Giri, K. V.; Rama Rao, P. B.; and Rajagopalan, R. (Dept. of Biochem., Indian Inst. of Science, Bangalore)
Food Research 18, No. 2, 217-222 (March/April, 1953)

The reaction concerned with the browning of proteins when they are heated in the presence of reducing sugars (Maillard reaction) has received considerable attention. This reaction affects the nutritive value of processed foods and is therefore of importance in nutrition. Knowledge of the amino-acid destruction that occurs in proteins when they are autoclaved with a reducing sugar is not complete; consequently, further investigation of the problem was desirable.

The materials used in this study were casein (Hammerstein), egg albumen (B.D.H.), gelatine (Eastman Kodak), fibrin (Difco), and pure glucose.

The procedure was as follows: One gram of pure glucose and 0.5 ml. of distilled water were added and mixed with each gram of protein. The protein-glucose mixtures were then autoclaved at 15 pounds pressure for varying periods of time. Controls consisting of protein only were also autoclaved at 15 pounds pressure for varying periods of time.

After intervals of 1/2, 1, 2, and 8 hours of autoclaving the proteins were hydrolyzed with 6N HCl (25 ml. for every gram of protein) by further autoclaving at 15 pounds for 6 hours. A control experiment carried out with the unautoclaved protein-glucose mixture showed no significant loss of amino acids as a result of acid hydrolysis (table 1, this card over).

A circular paper chromatographic analysis procedure was used to show the destruction of amino acids. Eight protein hydrolyzates were spotted around the circumference of a circle 4 cm. in

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 ABSTRACTER: Martin Heerdt

COMPOSITION OF SEA FOAM

CHEMISTRY OF FISH REPELLENTS

METABOLISM OF MARINE BACTERIA

MAILLARD REACTION

0.39 (Cross Reference: 2.1127)

sulphydryl groups to disulfides, and (3) alkylating agents which replace the hydrogen of the thiol to form alkylated compounds. All of these mechanisms involve either a complete loss of electrons (oxidation), or a replacement of a slightly electronegative hydrogen atom by a more electronegative atom (heavy metal or carbon of the alkylating group) with a loss in the share of electrons held by the sulfur atom of the thiol group, that is, oxidation of the sulfur. Chemical groups that impart the most irritant quality to molecules of this type are aliphatic and aromatic nitro compounds, nitroso compounds, halogenated substances with the halogen alpha to a carbonyl or phenyl group, halogens linked to a metal in metallo-organics, disulfides, quinones, and compounds with a carbonyl conjugated to a double bond. Many of these compounds are typical alkylating agents, and all are oxidizing agents.

The table below shows a few selected examples of the irritant activity of chemicals which it is believed inhibit the sulphydryl group through their action as alkylating or oxidizing agents.

Chemical	Dilution in parts per million				
	10·0	1·0	0·1	0·05	0·01
Phenacyl chloride	+++	+++	++	+	
Phenacyl bromide	+++	+++	+++	+++	+
2,4-Dinethyl phenacyl chloride	+++	+			
Benzyl chloride	+	–			
Benzyl bromide	+++	+++	+++	–	
Methyl isothiocyanate	+++	+++	+		
Allyl isothiocyanate	+++	+++	++	+	–
Nitrobenzene	+				
8-Trinitrobenzene	+++	++	+		
Benzoquinone	++	+			
Anthraquinone	+				
Potassium ferricyanide	++	+			
Potassium cyanide	+++	++	+		
Iodoacetic acid	++				
Isopropyl thiocyanate	+++	+++	–		
Bromine	+++	–			
Chlorine	+++	+			

+++ Indicates violent irritant activity; ++ indicates moderate irritant activity; + indicates slight irritant activity; and – indicates no irritant activity

0.33

diameter that had as its center the center of a Whatman No. 1 filter paper. The volume of solution used was 21 µl in each case. After the spots had dried, the chromatogram was developed with n-Butanol-acetic acid-water (40:10:10), sprayed with 0.5 percent ninhydrin solution in acetone, and dried at 65° C. for about 15 minutes. The procedure was essentially the same as the one described by Giri and Rao (1952). Typical chromatograms showing the amino acid composition of the protein-glucose mixtures after autoclaving are shown in figures 1 and 2, omitted.

Once the amino acids had been separated on the chromatogram they were determined quantitatively by a method essentially the same as that of Giri, Radhakrishman, and Vaidyanathan (1952). The chromatogram, after development, was sprayed with 0.5 percent ninhydrin in 95 percent acetone and dried at 65° C. for 30 minutes. The bands were then cut out and extracted with 5 cc. of 75-percent ethyl alcohol containing 0.25 mg. of $CuSO_4 \cdot 5H_2O$. The optical density of the resulting solution was measured by using a Klett-Summerson colorimeter with green filter (540 mµ). From these readings the relative concentrations of the different amino acids were expressed (tables 1 and 2, below) as percentages of the corresponding amino acid concentrations in the protein hydrolyzates not subjected to prior autoclaving with glucose.

TABLE 2

Effect of autoclaving of egg albumin, gelatin and fibrin with glucose on the destruction of amino acids

No.	Amino acids	Percentage of amino acids found in protein glucose autoclaved for 2 hours		
		Egg albumin	Gelatin	Fibrin
1	Cystine	100.0	93.0	100.0
2	Lysine, histidine	55.0	58.0	48.0
3	Arginine	11.0	28.0	13.0
4	Serine, glycine, aspartic acid	100.0	100.0	92.0
5	Glutamic acid, threonine	97.0	98.0	90.0
6	Alanine, tyrosine	100.0*	100.0	89.0
7	Methionine, valine	92.0	97.0	87.0
8	Leucine, I-leucine	92.0	100.0	92.0

*Alanine only in case of egg albumin-tyrosine excluded.

TABLE 1

Effect of autoclaving casein with glucose for varying periods of time on the destruction of amino acids

No.	Amino acids	Percentage of amino acid found in casein after autoclaving with glucose				Percentage of amino acids found in casein-glucose hydrolyzate (not autoclaved)
		Duration of autoclaving				
		½ hr.	1 hr.	2 hrs.	8 hrs.	
1	Cystine	100.0	94.0	92.0	83.0	100.0
2	Lysine, histidine	84.0	51.0	51.0	51.0	100.0
3	Arginine	41.0	0	0	0	100.0
4	Serine, glycine, aspartic acid	100.0	92.0	99.0	97.0	96.0
5	Glutamic acid, threonine	100.0	98.0	100.0	100.0	100.0
6	Alanine	92.0	94.0	100.0	100.0	98.0
7	Tyrosine	91.0	89.0	100.0	84.0	100.0
8	Methionine, valine	100.0	92.0	98.0	95.0	99.0
9	Leucine, I-leucine	100.0	96.0	99.0	100.0	99.0

0.34

No evidence was found to indicate that the apparent stabilizing particles were derived from living organisms that had been broken up by wave action. It is more likely that these particles were derived from detritus or fecal matter. The properties associated with foam formation appear to be surface rigidity and a decided rise in surface tension with an increase in surface area, rather than low surface tension by itself. The friction of the wind on the water compressing the surface film and causing it to "solidify" may be a factor that contributes to the formation of foam.

0.5

In studies of Group B organisms, all grew equally well on both natural and artificial sea-water medium. This showed that the presence of salts in the sea water was the factor allowing growth. Requirements of the organisms were checked by omitting various salts or groups of salts. Sodium ions were required by 19 of the 21 organisms; calcium, strontium, and magnesium by 10. Six of these ten required calcium. For eight organisms tested, sodium chloride could replace the mixture of sodium salts in the medium. Maximum growth of these organisms was still obtained when the sodium chloride was lowered to 1/10 of the original concentration. There was some growth present with 1/100 of the sodium chloride concentration.

When six organisms were tested by omitting salts from a chemically-defined medium, many requirements which had been either indefinite or unnoticeable on a nutrient broth medium became apparent. Although the phosphate ion is known to be required by some organisms of the B group and is probably required by all of them, this has yet to be proven. The following is a summary of the results of the B group study:

TABLE III.—Some mineral requirements of organisms of the B Group (requiring sea water for growth).

Organism	Ions shown to be required for growth	Comments
B-9	Sodium, potassium, magnesium, calcium	
B-10	Sodium, potassium, magnesium	
B-16	Sodium, potassium	Magnesium ion probably required
B-20	Sodium, potassium, magnesium	
B-26	Sodium, potassium, magnesium	
B-30	Sodium, potassium, magnesium	Strontium ion possibly required

3.33 ESTIMATION OF STERILIZING VALUES OF PROCESSES AS APPLIED TO CANNED FOODS. II. PACKS HEATING BY CONDUCTION: COMPLEX PROCESSING CONDITIONS AND VALUE OF COMPING-UP TIME OF RETORT

Gillespy, T. G.
Journal of the Science of Food and Agriculture 4, No. 12, 553-565 (December, 1953)

Heat flow in some canned foods is entirely by conduction, and the can behaves, during both heating and cooling, as a homogeneous solid obeying the known laws of heat conduction. You can thus calculate the temperature at any point in the can at any time in the process, given the initial temperature, the surface temperature, the dimensions of the can, the heat conductivity, and the specific heat (combined as the diffusivity) of the contents. The surface temperature (the processing temperature and the cooling temperature) may be varied during the process in any way whatever, and the only result of complex processing conditions is an increase in the labor of computation.

The variation in temperature at any point in the can may be followed by direct observation, but if this method alone is relied upon, each change of conditions demands a new set of observations.

When the "plot" of the central temperature of the can is available either by observation or calculation, the value of the process for the center of the can, F_c, may be determined graphically by the method of Bigelow et al. or arithmetically by the method of Patashnik. When processing conditions are simple, the F_c value may be calculated directly by the method of Ball or Gillespy.

The purpose of the present paper was to place on record a method whereby the change in temperature at the center of a can of food heating by conduction may be calculated for a process of any degree of complexity. (As a corollary, the value of the coming-up time of the retort may be

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 ABSTRACTER: F. Bruce Sanford

3.30 POSSIBILITIES FOR THE PRODUCTION OF FISHERY SPECIALITY PRODUCTS IN ALASKA -- TECHNICAL NOTE NO. 28

Landgraf, Raymond G., Jr. (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 15, No. 12, 18-19 (December, 1953)

As part of an effort to develop off-season industries to provide work for Alaska residents before and after the short salmon-canning season, the Fishery Products Laboratory at Ketchikan has been conducting studies with the production of various fishery specialty products. A specialty product is defined here as "any distinctive fishery product, either canned (heat processed), pickled, smoked, or frozen, that requires more than the minimum amount of effort in its preparation and packaging." Specialty products are classified into three general categories: (1) Low-priced large-volume products; (2) medium-priced large- or medium-volume products; and (3) high-priced limited-volume products.

Alaska with its abundance of raw materials is capable of producing a variety of specialty fish products. In addition to the many species of fish and shellfish that are not being fully utilized for food purposes, there are great quantities of edible trimmings discarded each year by the salmon canneries.

The methods developed at the Ketchikan laboratory are geared for the small plants in Alaska which do not have capital for the purchase of expensive equipment or the employment of technically trained personnel. The following products have been developed to date: kelp sea pickles and relish, smoked salmon caviar spreads, smoked chum salmon spread, canned smoked salmon, canned smoked clams, canned smoked shrimp, and various smoked products from Alaska herring. Each of these products has been tested by the Laboratory's taste panel and found to be very acceptable.

(over)

 ABSTRACTER: Roy C. Stevens

2.1120 PLASTIC NET FLOAT

Anonymous
Pan American Fisherman 8, No. 6, 20 (January, 1954)

A new fishing net float made of an expanded plastic material and possessing unusual buoyancy has been put on the market by a British firm. It is said that no repairs or maintenance are needed for the new float which is very light in weight, verminproof, odorless, non-inflammable, resistant to gasoline, oil, and most chemicals; also, it will not support the growth of molds or bacteria.

Tests were carried out by the Norwegian Fishery Directorate with various floats sunk to depths of about 400 feet. It was found that while cork floats became waterlogged and Norwegian plastic floats were compressed to less than half size, the new British plastic floats were completely unaffected.

Tests have shown that one of these floats of one cubic foot will support a weight of 60 pounds in water indefinitely. After two weeks of complete immersion in water of 65° F., the moisture absorption was only 0.15% by volume.

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3.234 FREEZING FISH AT SEA--NEW ENGLAND. PART 7 -- PICTORIAL STORY OF OPERATIONS AT SEA AND ASHORE

Anonymous
Commercial Fisheries Review 15, No. 12, 1-12 (December, 1953)

The Branch of Commercial Fisheries of the U. S. Fish and Wildlife Service has for the past five years been investigating the practicability of freezing fish at sea for later thawing, filleting, and refreezing ashore. This work has been carried out aboard the trawler Delaware and at the Service's Boston laboratory. The fish for the study are frozen in the round (ungutted) in refrigerated sodium-chloride brine and then stored in refrigerated holds until the vessel reaches port.

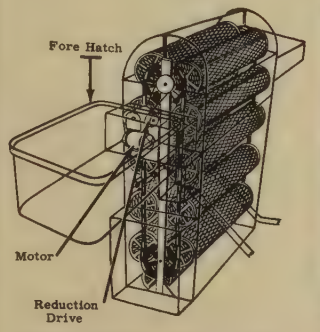
The best method of thawing appears to be the immersion of the frozen fish in circulating water. All freezing and thawing methods are being evaluated on the basis of chemical, physical, and organoleptic tests.

Previous articles in this series have described this work in detail. The present article is a pictorial story of these operations at sea and ashore. Thirty-nine well-captioned pictures are included.

(over)

 ABSTRACTER: Roy C. Stevens

3.234 (Cross Reference: 3.231)



Eleven expanded-metal, cylindrical baskets hold the fish for freezing. The baskets are conveyed through refrigerated, circulating brine.

After the fish have been placed in the freezer basket, the entire mechanism rotates periodically immersing the fish in the refrigerated brine. Indicator dials on the end of the freezer cover show when each basket is ready for unloading.

3.33 (Cross Reference: 0.6)

estimated in terms of time at retort temperature.) The method is adopted from that of Riedel. Appropriate new tables are presented, and the derivation of the method is given in the appendix to the paper. A limitation on the method is that all changes in external temperature shall be either instantaneous or rectilinear in relation to time.

3.30

The above products are only a few of those that could be produced from the fishery resources of Alaska. The main problems facing potential producers in Alaska are the high costs of labor, material, and transportation to volume markets. However, it is felt that small operators should be able to produce profitably many of the products listed.

The best method of marketing any Alaska sea food specialty would probably be in gift packages. This method has proved to be very profitable in the fruit industry. It is felt that fancy packs of these items in colorful containers, attractively packaged, would sell for premium prices.

1.0142 FISHERY MINISTER'S REPORT FOR 1952

Fishery Minister
Copenhagen, Denmark

The total catch of fish, crustaceans, and molluscs in 1952 was 309.6 million kilograms valued at about 186.4 million Danish crowns paid to fishermen.

1.016 SURVEY OF THE SPONGE FISHERIES OF LIBYA

Anonymous
FAO Fisheries Bulletin 6, No. 5, 205 (September/October, 1953)

(Abstract of this article appears under 6.9 page 7 - February 1954 issue)

1.1 A PRELIMINARY INVESTIGATION OF THE BACTERIAL FLORA OF THE MACKERELS OF THE WEST COAST

Venkataraman, R. and Sreenivasan, A.
Indian Journal of Medical Research 40, No. 4, 529-533 (October, 1952)

(Abstract of this article appears under 0.5 page 9)

1.1 VITAMINS IN NORWEGIAN FISHES. I. NIACIN, PANTOTHENIC ACID, VITAMIN B_{12}, AND VITAMIN A CONTENT OF THE WHOLE FISH AND THE ORGANS OF HERRING (CLUPEA HARENGUS) AND MACKEREL (SCOMBER SCOMBRUS)

Braekkan, Olaf R. and Probst, Ada
Report on Technological Research Concerning Norwegian Fish Industry II, No. 13, 10 pp. (1953)

(Abstract of this article appears under 8.64 page 7)

1.1 PREPARATION, PROPERTIES AND CRYSTALLIZATION OF TUNA PEPSIN

Norris, Earl R. and Mathies, James C.
Journal of the American Oil Chemists' Society 30, No. 11, 538-539 (November, 1953)

(Abstract of this article appears under 6.131 page 1 - February 1954 issue)

1.1 A NOTE REGARDING THE TOXICITY OF THE FISHES OF THE SKIPJACK FAMILY, KATSUWONIDAE

Halstead, Bruce W.
California Fish and Game 40, No. 1, 61-64 (January, 1954)

(Abstract of this article appears under 2.9 page 11)

1.2 VITAMINS IN NORWEGIAN FISHES. I. NIACIN, PANTOTHENIC ACID, VITAMIN B_{12}, AND VITAMIN A CONTENT OF THE WHOLE FISH AND THE ORGANS OF HERRING (CLUPEA HARGENUS) AND MACKEREL (SCOMBER SCOMBRUS)

Braekkan, Olaf R. and Probst, Ada
Report on Technological Research Concerning Norwegian Fish Industry II, No. 13, 10 pp. (1953)

(Abstract of this article appears under 8.64 page 7)

1.2 INVESTIGATION ON KEEPING QUALITY OF MILD CURED HERRING TREATED WITH VINEGAR

Gilberg, Yngvar
Report on Technological Research Concerning Norwegian Fish Industry II, No. 11, 23 pp. (1953)

(Abstract of this article appears under 3.5 page 3)

1.2 THE FREEZING AND COLD STORAGE OF HERRINGS

Banks, A.
Modern Refrigeration 54, No. 637, 96-98 (April, 1951)

(Abstract of this article appears under 3.249 page 13)

1.2 INVESTIGATION ON KEEPING QUALITY OF MILD CURED HERRING

Gilberg, Yngvar
Report on Technological Research Concerning Norwegian Fish Industry II, No. 12, 23 pp. (1953)

(Abstract of this article appears under 3.5 page 3)

1.2 SUMMARY OF RESEARCH ON PRESERVATION

Anonymous
Meld. fra SSF, No. 7, 159-160 (November, 1953)

(Abstract of this article appears under 3.12 page 15 - February 1954 issue)

1.2 PROBLEMS OF NORTHERN NORWAY

Arefjord, M.; Arnesen, E.; Eriksen, L.; Sand, G.; and Gloppestad, E.
Meldinger Fra SSF, No. 5, 89-112 (September, 1953)

(Abstract of this article appears under 2.03 page 11 - February 1954 issue)

1.30 UTILIZATION OF ALASKAN SALMON CANNERY WASTE PARTS I AND II

Stansby, Maurice E. and Associates
Special Scientific Report: Fisheries No. 109

1.30 THE DRESSING, CURING, AND SMOKING OF SALMON

Dewberry, Elliot B.
Food Manufacture 28, No. 11, 425-427 (November, 1953)

(Abstract of this article appears under 3.4 page 11 - February 1954 issue)

1.30 NEW CANNED, PREPARED SALMON PRODUCT

Anonymous
Pacific Fisherman 51, No. 13, 58 (December, 1953)

(Abstract of this article appears under 2.06 page 13 - February 1954 issue)

1.81 THE EFFECT OF STANDING, HANDLING, AND SHIPPING ON FREE LIQUID, SOLIDS, AND SALT CONTENT OF OYSTERS

Daughters, G. T. and Hoshall, E. M.
Journal of the Official Agricultural Chemists 36, No. 3, 947-954 (August 15, 1953)

(Abstract of this article appears under 2.00 page 5 - February 1954 issue)

1.82 SHELLFISH POISONING FROM CALLISTRA BREVISIPHONATA (CARPENTER) AND ITS CLINICAL SYMPTOMS

Asano, Motokazu; Takayanagi, Fumio; and Kitamura, Teruko
Tohoku Journal of Agricultural Research III, No. 2, 321-330 (March, 1953)

(Abstract of this article appears under 2.9 page 5 - February 1954 issue)

1.86 OBSERVATIONS ON THE CANNING OF PACIFIC COAST OR DUNGENESS CRAB

Farber, Lionel
Food Technology 7, No. 11, 465-468 (November, 1953)

(Abstract of this article appears under 3.33 page 9 - February 1954 issue)

2.112 DEFINITION AND EXPLANATION OF COMMERCIAL FISHING GEAR

Anonymous
Fishing Gazette 70, No. 11, 78 (November, 1953)

2.1127 RELATION OF CHEMICAL STRUCTURE TO IRRITANT RESPONSES IN MARINE FISH

Hiatt, Robert W.; Naughton, John J.; and Matthews, Donald C.
Nature 172, No. 4385, 904-905 (November 14, 1953)

(Abstract of this article appears under 0.39 page 17)

2.1128 NEW CRAYPOT WITH WELDED MESH AND HOW TO MAKE IT

Williams, F. R. and Hocking, A. W.
Fisheries Newsletter 12, No. 9, 12 (September, 1953)

2.113 HOW TO REDUCE LOBSTER TRAP BORER DAMAGE

Dow, Robert L. and Baird, Frederick T., Jr.
Atlantic Fisherman 34, No. 10, 16-17 (November, 1953)

(Abstract of this article appears under 2.113 page 19 - February 1954 issue)

2.113 SEA URCHINS DAMAGE STEEL PILING

Irwin, Margaret Constance
Science 118, No. 3063, 307 (September 11, 1953)

Sea urchins have been discovered making holes in the steel 8-in. H-beam piles of a pier near Ellwood, California.

2.113 USE OF X-RAY STEREOSCOPY FOR EXAMINING SHIPWORM INFESTATION IN VIVO

Crips, D. J.
Nature 172, No. 4374, 408 (August 29, 1953)

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Analyst
Analytical Chemistry
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Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
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Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fisherman
Fishermen's News
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Foreign Commerce Weekly
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

2.115 IMPROVING THE DESIGN OF CANADIAN FISHING BOATS

Chapelle, H. I.
Canadian Fisherman 40, No. 9, 19 (September, 1953)

2.116 THE FUTURE OF ECHO DETECTION

Craig, R. E.
World Fishing 2, No. 8, 303 (August, 1953)

2.118 BY-PRODUCTS KEY TO PROFITABLE OPERATION OF FACTORY SHIPS

Hardy, A. C.
Maine Coast Fisherman 8, No. 3, 28 (October, 1953)

2.119 FIBERGLAS PLASTIC FOR BOATS

Anonymous
Fishing Gazette 70, No. 8, 64 (August, 1953)

3.33 PRESSURE COOKING AND COOLING. PART II

Davis, L. C.
Food Manufacture 28, No. 8, 310 (August 1, 1953)

3.33 BRITISH PROCESS HERRING TO RESEMBLE SALMON

Anonymous
Western Fisheries 46, No. 6, 24 (September, 1953)

"Processing herring to resemble salmon in taste, smell, and appearance is reported from Freserburgh. Research has been processing in this direction for some time. It is indicated that only experts can tell the origin of the new pack, and then only by texture. Initial tests have proved that the new herring-converted-to-salmon pack will have a good demand and plans are being made for an expansion of production to exploit the process. It is claimed that the process eliminates the defects which limit the sale of canned herring, without eliminating any of the nutritional value of the fish."

4.21 STUDIES ON THE FATTY ACID OXIDIZING SYSTEM OF ANIMAL TISSUES. II. β-KETOACYL DERIVATIVES OF COENZYME A

Beinert, Helmut
Journal of Biological Chemistry 205, No. 2, 575-584 (December, 1953)

The preparation of acetoacetyl, β-ketohexanoyl, and β-ketooctanoyl CoA by enzymatic dehydrogenation of the corresponding β-hydroxy derivatives of CoA is described.

4.21 RECENT DEVELOPMENTS IN THE STUDY OF OXIDATIVE DETERIORATION OF LIPIDS

Lea, C. H.
Chemistry and Industry, No. 49, 1303-1309 (December 5, 1953)

4.64 OXIDATIVE FAT RANCIDITY IN FOOD PRODUCTS. I. LINOLEATE OXIDATION CATALYZED BY HEMIN, HEMOGLOBIN AND CYTOCHROME C^a

Tappel, A. L.
Food Research 18, No. 6, 560-573 (November/December, 1953)

(Abstract of this article appears under 4.5 page 1)

8.61 VITAMINS IN NORWEGIAN FISHES. I. NIACIN, PANTOTHENIC ACID, VITAMIN B_{12}, AND VITAMIN A CONTENT OF THE WHOLE FISH AND THE ORGANS OF HERRING (CLUPEA HARENGUS) AND MACKEREL (SCOMBER SCOMBRUS)

Braekkan, Olaf R. and Probst, Ada
Report on Technological Research Concerning Norwegian Fish Industry II, No. 13, 10 pp. (1953)

(Abstract of this article appears under 8.64 page 7)

8.6170 CONTENT OF VITAMIN A IN BASIC COMMERCIAL FISH AND SEAL OF VOLGA-CASPIAN SEA BASIN

Kolchev, V. V.
Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik 1, 182-206 (1951)
Chemical Abstracts 47, No. 11, 5630 (1953)

8.6170 NEOVITAMIN A AND VITAMIN A ALCOHOL IN COMMERCIAL FISH-LIVER OILS AND VITAMIN A CONCENTRATES

Hayes, Edmund and Petitpierre, Margaret A.
J. Pharm. and Pharmacol. 4, 879-85 (1952)
Chemical Abstracts 47, No. 4, 1896 (1953)

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